6.3 ARCHITECTURAL COMPONENTS

6.3.2 INTERIOR PARTITIONS

6.3.2.2 INTERIOR PARTITION WALLS, LIGHT

Light partitions may be full height (extending from floor-to-floor) or partial height (extending to the ceiling but not to the structural framing above) and are typically built using wood or metal studs with gypsum board or lath and plaster finish.

TYPICAL CAUSES OF DAMAGE

- Light partitions may be damaged as a result of in-plane or out-of-plane loading if not properly detailed. Full height partitions in flexible structures may fail unless they are isolated from the building deformations. Typical damage consists of cracked or spalled finishes, deformed partition faming, and failed connections. Partial height partitions may damage ceiling framing to which they are attached or can fall out-of-plane unless they are laterally braced to the structure above.
- Partition failures may create failing hazards, block corridors, and endanger occupants attempting to exit from damaged buildings.
- Where partitions are used as lateral support for electrical panels, storage shelves, or other nonstructural items, the failure of the partition wall may result in damage to these other components. Unless the partitions are properly designed, heavy items anchored to a light wall could also precipitate failure of the partition wall.
- Metal stud partitions are often detailed on drawings with a slip track to allow relative movement between the vertical studs and gypsum sheathing (attached to the lower floor) and the top track (attached to the slab above). Although these detail drawings typically state that full height gypboard should not be screwed to the top track, it is quite common to find them screwed together in the field rendering them the same as rigidly attached partitions. Gypsum board partitions (8 ft tall) that are rigidly attached to two adjacent floors typically are damaged with approximately 0.5 inch of interstory drift.

Damage Examples

Figure 6.3.2.2-1 Failure of inadequately braced partial height metal stud partitions in the 1994 Northridge Earthquake (Photo courtesy of Wiss, Janney, Elstner Associates).

Figure 6.3.2.2-2 Damage to wood stud wall spanning floor-to-floor in the 1994 Northridge Earthquake (Photo courtesy of Wiss, Janney, Elstner Associates).

SEISMIC MITIGATION CONSIDERATIONS

- For multistory and other engineered buildings, non-load bearing partitions should be isolated from the structural system in order to minimize costly partition damage. For these situations, full height partitions need out-of-plane restraint with an in-plane slip joint to isolate them from the building deformations. This is typically provided through special metal stud framing details. Note that special details may be required to meet fireproofing, sound proofing, weatherproofing, or insulation requirements. Additionally, care must be taken in detailing a series of interconnected perpendicular walls since the out-of-plane restraints along one wall may prevent slip on the perpendicular wall.
- In smaller buildings, it may be prudent to anchor all full height walls to the structural diaphragm above; in this way the partitions, if sheathed from floor-to-floor, provide additional lateral resistance for the building. Partial height partitions must be laterally braced to the structure above; braces may be required at 6 to 8 foot intervals; check code requirements.

- If partition walls will be used to provide lateral restraint for other nonstructural items, check that the walls and the lateral restraints at the top are adequate to resist the additional loading.
- New or improved restraint systems for steel stud partitions are under development; one such scheme was tested at Stanford University in July 2010 that allows for over 1.5" of displacement in any horizontal direction. Check the internet for additional restraint options.

Mitigation Examples

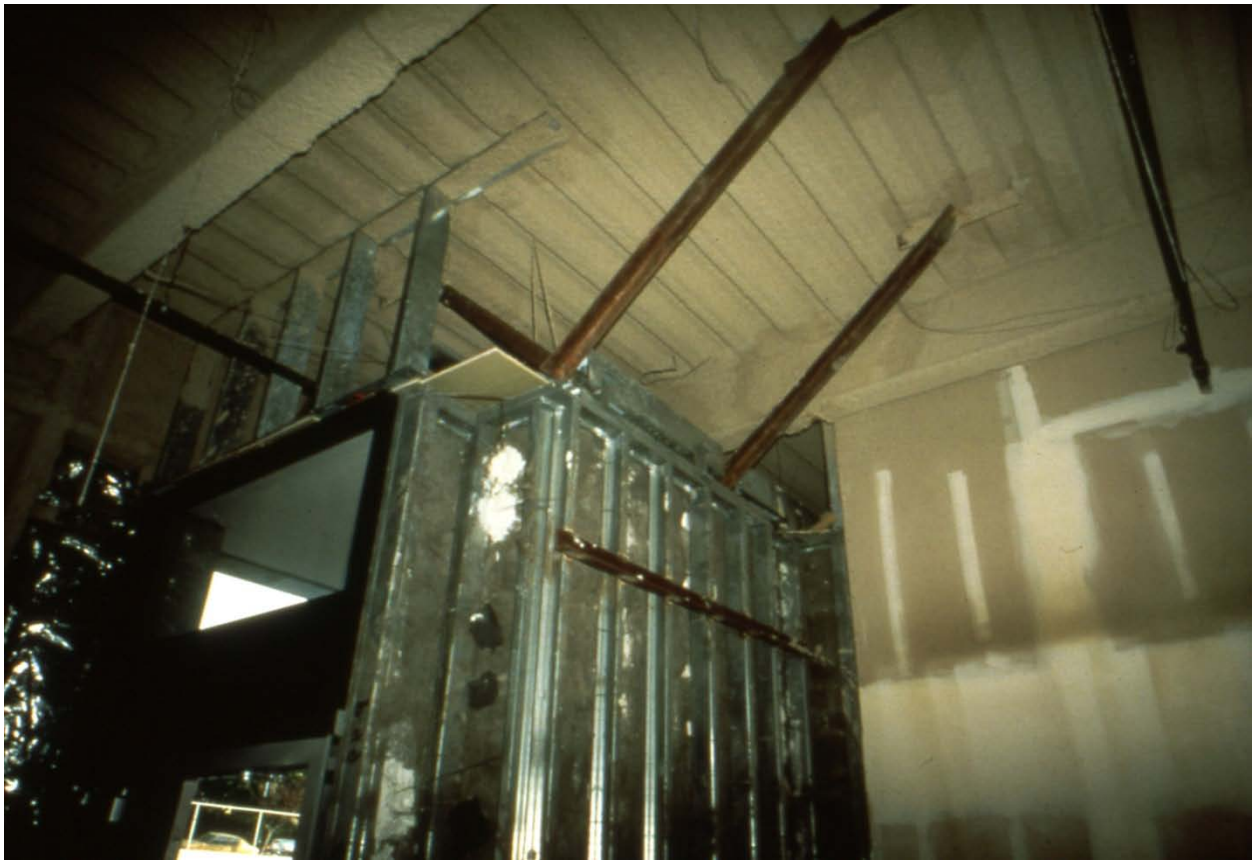

Figure 6.3.2.2-3 Bracing of partial height stud partition (Photo courtesy of Degenkolb Engineers).

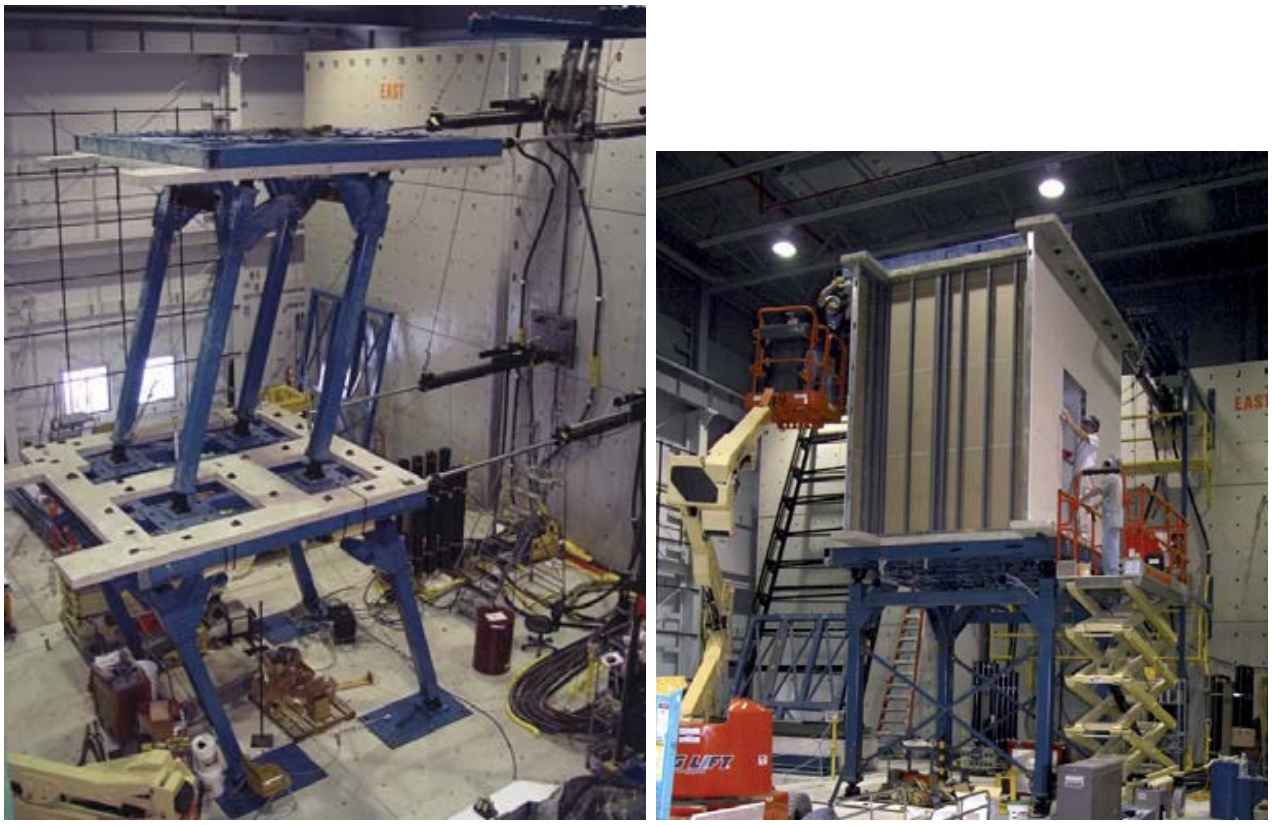

Figure 6.3.2.2-4 Two-story nonstructural component simulator at the University of Buffalo, SUNY shown at left. Preparation for dynamic testing of stud partitions for the NEES Nonstructural Project shown at right. Tests such as these improve understanding of the seismic behavior of nonstructural components (Photos courtesy of University of Buffalo, SUNY).

Mitigation Details

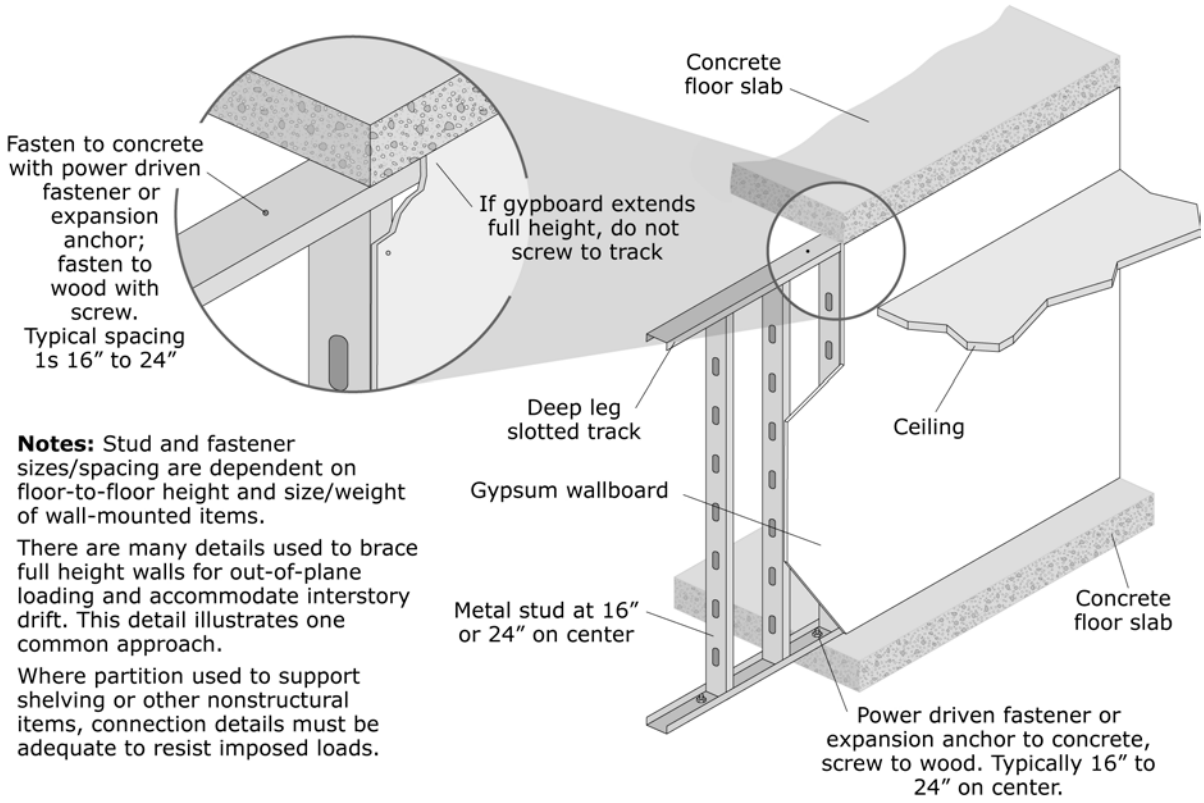

Figure 6.3.2.2-5 Full height nonbearing stud wall (ER).

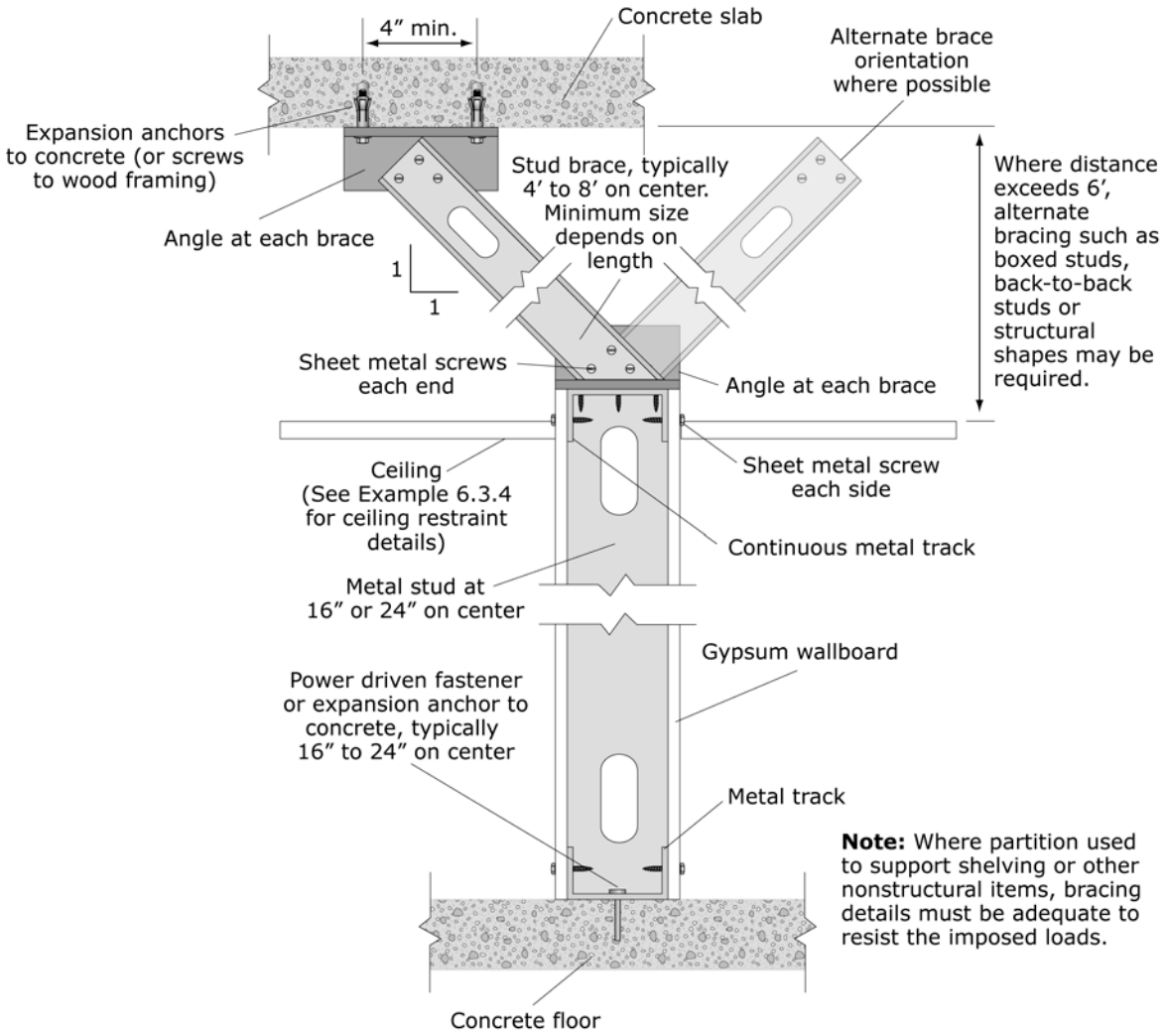

Figure 6.3.2.2-6 Partial height nonbearing stud wall (ER).